

your *Felis lanea* in the South-African museum, sent from the same place (the Beaufort-West Karras) by the late Arthur V. Jackson, who killed it himself. Unfortunately I received the skin in very bad condition. The ground-colour is much paler than in your plate, almost white.

“Jackson and I thought it an albinism (or rather erythrism) of *F. jubata* (see Catalogue of S. A. Museum, p. 38, No. 82, *Gueparda jubata*, specimen *b*). At p. 39 of the same Catalogue, I remark that we have had notices of a second species of Maned Leopard, with solid spots and with retractile claws, from Natal. The claws of your animal are not shown in Smit’s plate. What is their structure?”

On this last point Mr. Selater stated that, so far as could be told from examination of the living animals, the claws of *Felis lanea* resembled those of *Felis jubata*, being observable when the feet were at rest, and being but slightly extensile.

The existence of a second specimen of the animal in the South-African Museum (of which Mr. R. Trimen had also informed Mr. Selater) was a fact of great interest.

Mr. Selater read some Supplementary Notes on the Curassows (Cracidæ), mainly based on specimens which had been received by the Society alive since Mr. Selater’s previous memoir on this subject had been read five years ago.

This paper will be published in the Society’s ‘Transactions.’

The following papers were read:—

1. On the Squirrels of the Neotropical Region.

By EDWARD R. ALSTON, F.L.S., F.Z.S., &c.

[Received June 3, 1878.]

(Plate XLI.)

No better example of a polymorphic genus can be found than the almost cosmopolitan *Sciurus*. Even our common European Squirrel assumes such phases of coloration in the north, in the east, and among the Alps that the extremes would undoubtedly be considered perfectly distinct species if the intermediate links were not known. The same variability is found to a still greater extent in many of the Oriental species; while the polymorphism of some of the North-American forms was pointed out by Professor Baird more than twenty years ago.¹

It is only lately that similar critical attention has been given to the Squirrels of the Neotropical Region. Of these no fewer than *fifty-nine* nominal species have been described by various writers. The late Dr. Gray, in 1867, published a “Synopsis of the Species

¹ Mamm. North Amer. pp. 244, 245.



J. Smit lith

Hanhart imp

SCIURUS PUSILLUS



of American Squirrels in the Collection of the British Museum”¹, in which he recognized *twenty-nine* Neotropical species as being represented in the national cabinet, *nineteen* of them being described as new. Last year appeared Messrs. Coues and Allen’s exhaustive volume of ‘Monographs of North-American Rodentia’², in which the Squirrels are discussed by the last-named zoologist, who includes the South-American species in his scope. Having had access to considerably larger series of specimens than were available to most previous writers, Mr. Allen was led to reduce the number of valid species of Neotropical Squirrels to ten, with two “subspecies,” namely:—

<i>Sciurus carolinensis.</i>	<i>Sciurus leucops.</i>
— — —, var. <i>yucatanensis.</i>	— — — <i>æstuans.</i>
— — — <i>colliæi.</i>	— — —, var. <i>rufo-niger.</i>
— — — <i>aureigaster.</i>	— — — <i>tephrogaster.</i>
— — — <i>boothia.</i>	— — — <i>gerrardi.</i>
— — — <i>hypopyrrhus.</i>	— — — <i>variabilis.</i>

He further remarked that he thought that “on the whole the number of species will, by future investigations, be further reduced rather than increased,” and that he had erred in recognizing too many species rather than too few.

No one who is acquainted with Mr. J. A. Allen’s recent memoirs on the geographical variation of species, needs to be reminded of his breadth of view and extreme carefulness in comparison; and in the present monograph these qualities are as conspicuous as ever. In it Mr. Allen has done a great service in reducing the complicated synonymy of the South-American Squirrels to some order; and if some of his identifications prove to be erroneous, the fault lies in the often totally insufficient or even misleading descriptions of some previous writers.

Within the last year I have been able to examine in the British Museum and the Museums of Berlin and Paris, the types of no less than *forty-one* nominal species of Neotropical *Sciuri*. In these collections I have also been able to compare much more extensive series of specimens than even Mr. Allen had access to; and, through his kindness, I have examined typical examples of the species recognized by him. This study has led me to accept many of Mr. Allen’s identifications (some of which are sufficiently startling at first sight), and in some instances to carry the reduction of species still further; but it has also enabled me to correct a few errors in his synonymy, and to point out a few apparently valid species with which he was not acquainted.

Particularly rich in this group are the Paris and British Museums; and the study of their long suites of specimens leads one irresistibly to conclusions which must appear strange to those who only know the extreme links of the chain. Among other things they

¹ Ann. & Mag. Nat. Hist. 3rd ser. xx. pp. 415-434.

² Rep. U.S. Geol. Survey of Territories, vol. xi.

have convinced me that Mr. Allen has laid too much stress on the comparative size of the ears, and length and bushiness of the tail, as distinctive characters. In both these points, as well as in the quality of the pelage, every intermediate stage is often to be found; and I have therefore been obliged to unite Mr. Allen's *S. aureigaster* and *S. leucops*, his *S. boothiæ* and *S. hypopyrrhus*, and his *S. gerrardi* and *S. variabilis*. On the other hand, I have felt obliged to recognize, at least provisionally, the specific rank of *S. stramineus*, *S. griseogenys*, *S. rufo-niger*, and *S. pusillus*, and more doubtfully that of *S. griseoflavus*,—thus raising the number of species from ten to twelve.

In facing the intricate and often baffling problem of distinguishing between "species" and "varieties" in such a protean group, I have endeavoured to act in harmony with Mr. Darwin's directions: "When a naturalist can unite by means of intermediate links any two forms, he treats the one as a variety of the other"¹. It must be remembered that many of these "varieties" apparently breed true and prevail in certain parts of the range; but all that are here brought together are united by such intergradations that a sufficient series at once convinces one of their identity. It is evident, however, that still more complete material will be required before every point can be regarded as definitely settled.

Before proceeding to remark on the various species², I must return my warmest thanks to all who have assisted me in this investigation, especially to Mr. J. A. Allen, Professor A. Milne-Edwards, Dr. Peters, and Dr. Günther.

I. SCIURUS CAROLINENSIS.

Sciurus carolinensis, Gmelin, Linn. Syst. Nat. i. p. 148 (1788, ex Pennant); Allen, Mon. N.-Am. Rodent, p. 700.

Length of head and body averaging 10 inches; of tail-vertebræ about 8 inches.

Upper parts grey or brownish grey, the middle of the back brownish, a rufous lateral stripe usually present; lower parts white. Tail moderate, washed with white, the hairs yellowish brown or whitish, with narrow black rings, broader black subterminal bands and white tips.

Hab. Southern Canada; Eastern United States; Mexico; Yucatan; Guatemala (?).

Concerning this well-known Nearctic form I can add almost nothing to Mr. Allen's exhaustive account. He distinguishes three geographical races or varieties, of which two, his "var. *carolinensis*" and "var. *yucatanensis*," are found within the Neotropical limits. The former, smaller and browner than the northern *leucotis* race, is apparently the *S. carolinensis* which M. de Saussure records from Mexico³ and Mr. Tomes from Guatemala⁴; and

¹ Origin of Species, 6th ed. p. 36.

² The species of which I have been able to examine the types or typical species are distinguished in the following pages by an asterisk.

³ Rev. et Mag. de Zool. 1861, p. 4.

⁴ Proc. Zool. Soc. 1861, p. 282.

there are specimens from Nuevo Leon in the National Museum at Washington. Mr. Allen's "var. *yucatanensis*" is based on specimens collected at Merida, which agree in their pale coloration, the absence of rufous on their flanks, their small size, and the comparative coarseness of their pelage. He considers that this form is "possibly specifically distinct," but remarks that the Nuevo-Leon examples are fairly intermediate; and, judging from the single typical example which Mr. Allen kindly lent me, I think he was wise in refusing it specific rank, at least for the present.

Of the geographical variations presented by the Grey Squirrel throughout its very extensive range, Mr. Allen observes they consist "mainly in decrease in size southward, and an increase in intensity of coloration, the whitish tips of the hairs of the dorsal surface seen in northern specimens being replaced by yellowish-brown in the southern ones, except in the case of var. *yucatanensis*." The decrease in size as we go southwards is of course strongly in favour of the distinctness of the next species.

II. *SCIURUS ARIZONENSIS*.

**Sciurus arizonensis*, Coues, Amer. Nat. i. p. 357 (1867).

(*Sciurus collicei*, Allen, Mon. N.-Am. Rodent, p. 738, nec Richardson.)

Length about 12.50, of tail-vertebræ 11 inches. Upper parts grey, more or less mixed with yellowish-brown, especially along the middle of the back; lower parts pure white. Tail long, very bushy, strongly washed with white, the hairs tawny or fulvous with two narrow and one broader black band, succeeded by a long white tip.

Hab. Arizona; California; Mexico.

Misled by imperfect descriptions and a bad figure of Richardson's type, Mr. Allen has referred the Arizona Squirrel of Dr. Coues to Richardson's *S. collicei*. He has since kindly intrusted me with a typical example of *S. arizonensis*; and I find that it is quite distinct from *S. collicei* (which is Mr. Allen's *S. boothice*), being much more nearly allied to *S. carolinensis*, from which, however, both Dr. Coues and Mr. Allen consider that it is "thoroughly distinct." The superior size, coloration of the long heavy tail, and absence of a lateral line appear to be constant, but in some specimens in the Paris and British Museums the grey of the upper flanks is not so clear from rufous as in the examples described by Mr. Allen. The example mentioned by that gentleman as having "the lower surface considerably varied with irregular patches and streaks of pale yellowish rufous" gives support to the opinion that further material will render it necessary to unite the next species with the present. If so, Dr. Coues's name must be retained, as it has priority over Gray's title.

III. *SCIURUS* *GRISEOFLAVUS*.

**Macroxus griseoflavus*, Gray, Ann. & Mag. Nat. Hist. 3rd series, xx. p. 427 (1867).

(*Sciurus leucops*, Allen, Mon. N.-Am. Rodent, p. 753, nec Gray.)

Length (in skin) about 13.50 inches, of tail-vertebræ 10.25 inches. Upper parts nearly uniform yellowish grey, the narrow black rings and minute whitish tips of the hairs merely obscuring the general tint produced by their broad pale-brown median bands; lower parts yellowish red, the hairs in one specimen obscurely ringed with black. Tail bushy, strongly washed with white; the hairs yellowish or pale brown, with two or three narrow and one broader black band succeeded by a long white tip.

Hab. Mexico (?); Guatemala.

Mr. Allen considers Gray's *M. griseoflavus* to be specifically identical with his *M. leucops* (*op. cit.* p. 753); and the original diagnosis certainly seems to give countenance to such a view. The typical specimens (five in number), however, are very different, and in my opinion are closely allied to the last species, of which I suspect it will eventually prove to be a southern race. More specimens, however, are required before they can be united; and provisionally I therefore accept *S. griseoflavus* as a distinct species.

It appears probable that this is Mr. Tomes's *S. ludovicianus* from Guatemala¹; and a Mexican specimen in the Copenhagen Museum, labelled "*Sc. affinis*, an sp. nov.? Reinh.," does not appear to be separable.

IV. *SCIURUS* *VARIEGATUS*.

Sciurus variegatus, Erxleben, Syst. Reg. An. p. 421 (1777, ex Hernandez).

**Sciurus aureogaster*, F. Cuvier, Hist. des Mamm. iii., livr. lix. (1829).

Sciurus leucogaster, F. Cuvier, Suppl. de Buff. i. Mamm. p. 300 (1831).

Sciurus albipes, Wagner, Abh. Bayer. Ak. ii. p. 101 (1837).

Sciurus ferruginiventris, Audubon & Bachman, P. Ac. Philad. 1841, p. 101.

Sciurus varius, Wagner, Suppl. Schreber Säugeth. iii. p. 168 (1843).

Sciurus socialis, Wagner, tom. cit. p. 170.

**Macroxus morio*, Gray, Ann. & Mag. Nat. Hist. 3rd series, xx. p. 424 (1867, nec Wagner).

**Macroxus maurus*, Gray, tom. cit. p. 425.

**Macroxus leucops*, Gray, tom. cit. p. 427.

(*Sciurus aureigaster* et *S. leucops*, Allen, Mon. N.-Am. Rodent. pp. 750, 753.)

Hab. Southern Mexico; Guatemala?

Average length about 10.50 inches, of tail-vertebræ 8.75 inches.

¹ Proc. Zool. Soc. 1861, p. 281.

Upper parts grey or reddish grey, the hairs black, tipped or ringed and tipped with white or red. Pelage somewhat soft, with a good deal of under-fur; lower parts deep red, orange, or white. Tail black, washed with white, the hairs usually rufous at their base, with black rings and white tips.

Under this name I feel myself obliged to bring together two Mexican Squirrels of which typical specimens are very different in appearance. Mr. Allen has kept them separate under the names of *S. aureigaster* and *S. leucops*, remarking that the difference in coloration leaves little doubt of their distinctness, but adding that "more abundant material may show that they are not specifically separable" (*op. cit.* p. 755). The colour-variation is not nearly so great as we shall find it to be in the next species; and after a careful examination of a great number of specimens, especially of the fine series in the Paris Museum, I have been unable to find a single distinctive character which is constant.

Typical specimens of the two forms may be thus described:—

1. The *aureogaster* type. Upper parts dark grey, the hairs black, finely tipped with white. Lower parts deep red, which is usually more or less washed over the grey on the shoulders and flanks.

2. The *leucops* type. Upper parts lighter grey, with a peculiar golden lustre, the hairs being finely ringed with bright rufous and tipped with white; nape and rump more strongly rufous. Lower parts bright red, orange, or white.

Many specimens, however, which have the general appearance of *aureogaster* show the rufous subterminal ring of *leucops* on some part of the dorsal surface; and in others we find the red nape and rump-patches gradually appearing. I am therefore compelled to return to the view long ago expressed by Isidore Geoffroy¹, and to regard them as varieties of the same species.

With regard to distribution, all the specimens which I have seen with authenticated localities are from Mexico; but Mr. Allen mentions one from Guatemala in the Washington Museum. Specimens in the British Museum are labelled as being from Columbia; but there can be little doubt that this is an error. *S. aureogaster* is stated by Prof. Sumichrast (as quoted by Mr. Allen) to be "the common species of *Sciurus* of the tierra caliente of the east coast" of Mexico; and both forms are found in the States of Oaxaca and Tehuantepec.

Turning to the question of synonymy, I must briefly explain why I have retained Erxleben's name for this species. Mr. Allen considers it to apply rather to the next species, but rejects it altogether, on the ground that it is based partly on Buffon's "Coquallin" (*S. niger*, L.), and partly on the "Cozticotequallin" of Hernandez. It is, however, primarily founded on the latter, Buffon's name being only quoted as a synonym; and Erxleben's diagnosis and description appear to me to be quite characteristic of the *leucops* form of the

¹ Voy. de la Vénus, Zool. pp. 156-163.

present species¹. By retaining this appropriate name, we are enabled to escape from F. Cuvier's barbarous term *aureogaster*, under which this beautiful animal has laboured in so many works. *S. albipes*, Wagner, afterwards re-named *S. varius* by its describer, is doubtfully referred to the next species by Mr. Allen; but the description, especially the character of the hairs being ringed with red, black, and white, appears to point certainly to identity with Gray's *S. leucops*. Wagner's *S. socialis* also, founded on a single example, seems also to be a synonym of the present species; for the characters of coloration by which he differentiates it from his *S. varius* are quite insufficient, and the small size may, as Mr. Allen suggests, be due to the immaturity of the specimen described.

V. SCIURUS HYPOPYRRHUS.

Sciurus hypopyrrhus, Wagler, Isis, 1831, p. 610.

**Sciurus nigrescens*, Bennett, P. Z. S. 1833, p. 41.

**Sciurus collicæi*, Richardson, Zool. Voy. 'Blossom,' p. 8, pl. i. (1839).

**Sciurus variegatoides*, Ogilby, P. Z. S. 1839, p. 117.

**Sciurus richardsoni*, Gray, Ann. Nat. Hist. x. p. 265 (1842, nec Bachman).

**Sciurus boothiæ*, Gray, List Mamm. Brit. Mus. p. 139 (1843).

**Sciurus griseocaudatus*, Gray, Zool. Voy. 'Sulphur,' p. 34, pl. xiii. (1844).

**Sciurus fuscovariiegatus*, Schintz, Syn. Mamm. ii. p. 17 (1845, ex Gray).

**Macroxus adolphei*, Lesson, Desc. de Mamm. &c. p. 141 (1847).

**Macroxus pyladei*, Lesson, tom. cit. p. 142.

**Sciurus dorsalis*, Gray, P. Z. S. 1848, p. 138, pl. vii.

**Sciurus rigidus*, Peters, Monatsb. Ak. Berl. 1863, p. 652.

**Sciurus oculatus*, Peters, tom. cit. p. 653.

**Sciurus intermedius*, Verreaux, ap. Gray, Ann. & Mag. Nat. Hist. ser. 3, xx. p. 421 (1867).

**Macroxus nicoyana*, Gray, tom. cit. p. 423.

**Macroxus melania*, Gray, tom. cit. p. 425.

(*Sciurus boothiæ* et *S. hypopyrrhus*, Allen, Mon. N.-Am. Rodent. pp. 741, 746.)

Hab. Central America, from the Pacific coast of Mexico to the Isthmus of Panama.

Average length about 11.75 inches, of tail-vertebræ 10 inches. Pelage close-lying and rather glossy, with little underfur. Upper parts dark brown or black, often broadly ringed with rufous or white. Lower parts varying from deep red to creamy white, sometimes ringed with black. Tail black, generally washed with white, the hair rufous, pale brown or whitish at their base, with one or two black or brown rings and a white tip.

In uniting all the very variously marked Squirrels the names of which

¹ "*S. corpore supra nigro, albo et fusco variegato. * * * Magnitudo dupla S. vulgaris. Auriculæ imberbes. Corpus supra nigro, albo et fusco variegatum, ventre flavescente. Cauda supra corpus reflexa.*"

are given above, I have gone beyond Mr. Allen, who divides them into two species under the titles of *S. hypopyrrhus* and *S. boothiæ*. The series of specimens to which he had access left him strongly impressed with their distinctness; but he adds that further material may show that they intergrade. After a careful examination of the large series contained in various Museums, and especially of that at Paris, I am quite convinced that this is the case, and have even grave doubts of the propriety of keeping them distinct from the last species. But as I have not yet found specimens strictly intermediate between *S. variegatus* and *S. hypopyrrhus* in the character of the pelage and the annulation of the fur, it seems best to keep them distinct.

The opinion has been expressed above that the differences in comparative length of tail and ears, on which Mr. Allen lays most weight in separating *S. boothiæ* from *S. hypopyrrhus*, cannot be depended on; and I have been totally unable to detect any constant difference in general stoutness of form or breadth of muzzle. As to colour, the intergradations of the different varieties are quite complete, so that it is often difficult or impossible to say to which a given specimen is to be referred. Each variety, however, has its own type, and seems to predominate in its own immediate locality. The five principal phases known to me may be thus arranged:—

1. The *hypopyrrhus* type. Upper parts dark-grey, the hairs black, ringed with white or pale fulvous. Lower parts either concolorous, with the upper or washed with rufous. To this variety I agree with Mr. Allen in referring Bennett's *S. nigrescens*; and it is to the same form that the description of *Macroxus boothiæ* in Gray's memoir of 1867 refers, although the same author's *Sciurus boothiæ* of 1833 was founded on a young example of the white-bellied *colliæi* phase. The rufous-bellied specimens lead us directly into

2. The *rigidus* type. Upper parts usually marbled with fulvous and black, the hairs being glossy brown or black with a median band of yellowish brown. Lower parts bright rufous (*rigidus*), or varied with rufous and white, either symmetrically (*intermedius*) or asymmetrically (*nicoyanus*). In many specimens, as observed by Mr. Allen, there is a more or less marked tendency to the development of a pale grizzled lateral stripe placed high on the flanks and confining the dark dorsal area to a broad median band. From these we have every gradation into the rufous phase of

3. The *dorsalis* type. Upper parts with the median dorsal area black, flanks and lower parts white, fulvous, or rufous. In many individuals the hairs of the black dorsal area will be found to have concealed rings of white or fulvous; so that we have a further transition into

4. The *colliæi* type. Upper parts much as in the *rigidus* form, but usually less rufous; lower parts white (*colliæi*, *adolphei*) or pale fulvous (*variegutoides*, *griseocaudatus*, *pyladei*, *oculatus*). Usually the dark coloration of the back is extended onto the shoulders, hips, and limbs; but in others it is confined to the middle of

the back, as in the last phase, while the rufous-bellied phases lead us directly back into the *rigidus* form.

5. The *melania* type. Upper and lower parts uniform glossy dark brown, often with irregular patches of paler brown. This is a very peculiar phase, and I have not yet seen any direct intergradation with the other varieties; but uniformity of coloration is so abnormal among the Squirrels, that it seems impossible to doubt that Mr. Allen is right in regarding it as a melanism. The colour is exactly similar to that of the white-bellied *dorsalis* varieties, in which also the paler apparently faded patches are sometimes seen. It appears to be much rarer than any of the other forms described.

With regard to the synonymy, I may observe that I have been able to examine the types of all the "species" here united, excepting that of *S. hypopyrrhus*, which, however, has been well described by Wagler and Wagner; it appears to be a dark variety without the usual wash of white on the tail. That of *S. nigrescens* only differs in having the fur of the lower parts ringed like that of the back; it agrees well with specimens in the Paris and Berlin Museums. *S. colliæi* and *S. adolphei* are synonyms for the white-bellied form above described, from which I am also unable to distinguish *S. richardsoni* of Gray (not of Bachman), on which both *S. boothiæ* and *S. fuscovariegatus* were founded. *S. variegatoides*, *S. griseocaudatus*, *S. pyladei*, and *S. oculatus* are all intermediate links with more or less fulvous lower parts, leading to the phase with a red or red and white belly, on which the names *S. intermedius*, *S. rigidus*, and *Macroxus nicoyanus* have been bestowed.

Of the geographical distribution of the various races we can only judge from the comparatively few specimens of which the exact localities have been noted. The *hypopyrrhus* phase appears to be the most northern, the *colliæi* to obtain principally along the Pacific slopes, and the *dorsalis* to be the most southern. Each, however, appears to be found along with others in some part. Thus, I have seen specimens of *hypopyrrhus* type from Mexico, Honduras, and Guatemala, of *rigidus* from Guatemala, Nicaragua, and Costa Rica, of *dorsalis* from Nicaragua, Costa Rica, Veragua, and Panama, and of *colliæi* from the west coast of Mexico and Guatemala, Nicaragua, and Costa Rica. The only localities which I know for *S. melania* are Nicaragua and Veragua.

VI. SCIURUS STRAMINEUS.

Sciurus stramineus, Eydoux & Souleyet, Voy. de 'La Bonite,' Zool. i. p. 37, Atlas, pl. ix. (1841).

**Sciurus nebouxii*, Is. Geoffroy, Voy. de 'La Vénus,' Zool. p. 163, Atlas, pl. xii. (1855).

**Macroxus fraseri*, Gray, Ann. & Mag. Nat. Hist. ser. 3, xx. p. 430 (1867).

(*Sciurus hypopyrrhus*, Allen, Mon. N.-Am. Rodent. p. 747.)

Hab. Ecuador; Peru.

Average length about 12.50 in., of tail-vertebræ 12.50. Upper parts nearly uniform grizzled grey, rump and lower parts more or

less washed with rufous, the hairs blackish towards their base, with long white fulvous or rufous ends; feet blackish; tail black, washed with rufous and whitish; pelage very sparse and harsh, with almost no under-fur.

This curious Squirrel, which appears to be the sole representative of the genus in Western Peru, is rare in collections; and though the few specimens which have been sent to Europe differ little in colour, they have received the above names. Mr. Allen referred three specimens from Guayaquil to *S. hypopyrrhus* (tom. cit. p. 747); and certainly some varieties of that species bear a strong general resemblance to the present. But so far as can be judged from the small series in the Paris and British Museums, *S. stramineus* seems to be fairly entitled to specific recognition; and intermediate forms are hardly likely to be found, as no similar Squirrel appears to be known from any part of Columbia. It is only fair to Mr. Allen to add, that Gray's description of *M. fraseri* is so imperfect that it is not surprising that the American zoologist should have doubtfully referred it to *S. tephrogaster* (tom. cit. p. 763).

A remarkable peculiarity of this species is its tendency to the development of irregular tufts of pure white hairs, rather longer than the rest of the fur, and sometimes uniting in larger patches. These asymmetrical markings are present in the majority of the individuals examined.

A fine specimeu of *S. stramineus* from Ecuador is now living in the Society's Gardens¹.

VII. SCIURUS VARIABILIS.

**Sciurus variabilis*, Is. Geoffroy, Mag. de Zool. 1832, pl. iv.

Sciurus langsdorffi, Brandt, Mém. Ac. St. Pétersb. 6^e sér. iii. p. 425, (1835).

Sciurus igniventris, Natterer ap. Wagner, Wiegman. Arch. 1842, p. 360.

Sciurus pyrrhonotus, Natterer, loc. cit.

Sciurus tricolor, Pöppig ap. Tschudi, Faun. Peruan. p. 156, pl. xi. (1844-46).

Sciurus morio, Wagner, Abh. Bayer. Ak. v. p. 275 (1850, nec Gray),

**Sciurus gerrardi*, Gray, P. Z. S. 1861, p. 92, pl. xvi.

**Sciurus brunneo-niger*, Castelnau ap. Gray, Ann. & Mag. Nat. Hist. ser. 3, xx. p. 429 (1867).

**Sciurus fumigatus*, Gray, tom. cit. p. 428 (1867).

(*Sciurus gerrardi* et *S. variabilis*, Allen, Mon. N.-Amer. Rodent. pp. 766, 768.)

Hab. Panama; Venezuela; Columbia; Ecuádor; Peru; Brazil; Bolivia.

Average length about 12 inches, of tail-vertebræ 11 inches. Upper parts red, either pure or more or less grizzled with black, lower parts white, fulvous, or light rufous, sharply defined from the dorsal colour-

¹ See above, p. 441.

ing; tail black, washed with bright-red orange, often very bushy. Pelage rather harsh and sparse, ears high and narrow.

Here, again, the greater amount of material at my disposal compels me to go beyond Mr. Allen in the identification of nominal species. Most of the above synonyms were brought together by him under the name of *S. variabilis*; but *S. gerrardi* and *S. ~~rufus-niger~~* were kept separate under the former title. The principal points on which he rested were the smaller size and shorter ears of *S. gerrardi*; but on examination of a sufficient series, I have not been able to find any constancy in the proportions of the ears, while the difference in size totally disappears, as is shown by the following series of measurements—9.50, 9.75, 10.00, 10.25, 10.75, 11, 11.50, 11.75, 12.00, 12.75, 13.00. The smaller specimens (*S. variabilis*, *S. gerrardi*, &c.) appear to prevail towards the north: but this is not constant; for a Santa-Martha example measures over 12 inches, while others from Brazil are under 10 in., although evidently adult. Nor is it constantly connected with any of the numerous varieties of coloration—rufous, grizzled, and melanistic specimens occurring of all sizes.

The range of these variations of colour is not nearly so great as in *S. hypopyrrhus*; and they seem to resolve themselves into three primary groups, namely:—

1. The *morio* type. Upper and lower parts black, only slightly ringed with rufous or fulvous, tail black, either entirely or slightly washed with red. Of this melanistic form no two specimens agree exactly in the proportion of red; and every step is present leading into

2. The *variabilis* type. Upper parts red, more or less varied with black—but the rufous tint prevailing, especially on the flanks; lower parts pure white, fulvous, or pale rufous; tail (either narrow or bushy) black, strongly washed with bright rufous or orange. Here we have an endless series of minor variations, from the very brilliant black and red specimens sent from the Rio Napo to the British Museum, and the bright rufous Columbian form, through more and more greyish red specimens, till we find ourselves in

3. The *langsdorffi* type. Upper parts reddish or yellowish grizzled, the hairs being pretty uniformly ringed with black and red or black and yellow; lower parts and tail as in the last.

Each of these styles appears to prevail in certain localities: thus the melanistic form has been found on the Upper Amazon by Mr. Bates and by Castelnau and Deville, the rufous type on the Rio Negro and Rio Madeira by Natterer, and the grizzled in North-western Brazil by Spix. But there seems to be no regularity in their distribution; and I have seen both grizzled and red specimens from Panama, Venezuela, Columbia, and North-eastern Peru.

The oldest name, and therefore the one here adopted, is *S. variabilis*, given in 1832 by Isidore Geoffroy to small red specimens from Columbia, and strictly synonymous with Gray's *S. gerrardi*; while *S. igniventris* and *S. pyrrhonotus* were MS. names of Natterer's, applied by Wagner to other varieties of the rufous type. *S. langs-*

brunneo-niger .

dorffi and *S. tricolor* both refer to the forms in which the upper parts are more or less uniformly grizzled; while *S. morio*, *S. ~~rufo~~ brunneo niger*, and *M. fumigatus*, are all more or less melanistic varieties.

VIII. SCIURUS GRISEOGENYS.

**Sciurus æstuans*, var. *hoffmanni*, Peters, Monatsb. Ak. Berl. 1863, p. 654.

**Sciurus hyporrhodus*, Gray, Ann. & Mag. Nat. Hist. ser. 3, xx. p. 419 (1867).

**Macroxus xanthotus*, Gray, tom. cit. p. 429.

**Macroxus griseogena*, Gray, tom. cit. p. 429.

(*Sciurus æstuans*, var. *rufo-niger*, Allen, Mon. N.-Am. Rodent. p. 757.)

Hab. Ecuador; Columbia; Venezuela; Panama; Veragua; Costa Rica; Nicaragua.

Length about 9 inches, of tail-vertebræ 8 inches. One upper premolar. Upper parts dark olive, the hairs dusky, very minutely annulated with rufous or fulvous; lower parts bright orange or rufous; tail black, more or less washed with bright red or deep orange, the hairs reddish brown banded with black and tipped more or less broadly with rufous.

Mr. Allen, in his monograph, regards this Squirrel as a "variety" or geographical race of the next species, differing in its uniformly larger size and strikingly in the coloration of its tail. In a subsequent letter to me, he says:—"It would perhaps be just as well to recognize it as entitled to specific rank, although I still feel sure of their intergradation." That such connecting links may yet be found seems very probable; but I have not been able to find such in the very large series which I have examined, and am consequently compelled to keep them provisionally distinct.

Unfortunately Mr. Allen has identified this species with Pucheran's *S. rufo-niger*, which, as will be seen presently, is a much smaller and quite distinct species¹. Dr. Peters described it only as a variety of *S. æstuans*; and though specimens in the Berlin Museum are labelled "*Sciurus hoffmanni*," the name remains a manuscript one. Of Gray's three titles I have adopted *griseogena* (more correctly *griseogenys*) as being simultaneous in date with the others, and as indicating the typical form. His *S. hyporrhodus* is founded on an example from Santa Fé de Bogotà, and is characterized by its long soft fur and hairy ears, peculiarities easily explained when we remember that that city stands at an elevation of over 8800 feet, and is overlooked by lofty mountains. *Macroxus xanthotus* is undoubtedly an immature animal, as is proved by the dentition of the type specimen. By some curious error Gray's account of this last has been printed after that of *M. brunneo-niger*, instead of after *M. griseogena*; so that the remark, "very like the former" &c., naturally led Mr. Allen to refer the synonym to *S. gerrardi*.

S. griseogenys varies very little in colour: in some examples the

¹ Cf. *infra*. p. 669.

middle of the back is considerably darker than the flanks; and there is some variety in the exact tint of the red wash on the tail. I can confirm Mr. Allen's statement that this species (as well as *S. variabilis* and *S. æstuans*) have normally only one upper premolar. Dr. Peters states, it is true, that the type of his "var. *hoffmanni*" had two; but the first was minute and only attached to the gum; and I have not been able to find more than one, either in dried skulls or in spirit-specimens.

IX. SCIURUS ÆSTUANS.

Sciurus æstuans, Linnæus, Syst. Nat. i. p. 88 (1766).

Myoxus guerlingus, Shaw, Gen. Zool. ii. p. 171, pl. clvi. (1801).

Sciurus gilvicularis, Natterer ap. Wagner, Abh. Bayer. Ak. v. p. 283 (1850).

**Macroxus leucogaster*, Gray, Ann. & Mag. Nat. Hist. ser. 3, xx. p. 430 (1867, nec F. Cuv.).

**Macroxus irroratus*, Gray, tom. cit. p. 431.

**Macroxus flaviventris*, Castelnau ap. Gray, tom. cit. p. 432.

(*Sciurus æstuans*, var. *æstuans*, Allen, Mon. N.-Am. Rodent. p. 756, 1877).

Hab. Guiana; Brazil; Eastern Peru; Bolivia.

Average length about 7.25 inches, of tail-vertebræ 7 inches. One upper premolar. Upper parts olive, rather lighter and more fulvous than in the last species; lower parts fulvous, greyish, or white; tail black, more or less washed with pale fulvous, the hairs pale brown, banded with black and tipped with pale faded yellow.

I have little to add to Mr. Allen's critical notes on this well-known Squirrel. Gray states, in his description of his *M. leucogaster* (not to be confounded with F. Cuvier's species of that name¹), that the hairs of the lower parts are "white to the base;" this is not the case, though the dusky colour at the roots is little developed on the chest. *M. irroratus* must also be placed here, although the original description is such that Mr. Allen unhesitatingly referred it to the last species; and *M. flaviventer* is to me quite undistinguishable from the ordinary type of *S. æstuans*. *S. pusillus*, Geoffr., and *Macrotus kuhlii*, Gr., are considered by Mr. Allen to be the young of the present species; but I believe them to be quite distinct².

X. SCIURUS DEPPEI.

**Sciurus deppei*, Peters, Monatsb. Ak. Berl. 1863, p. 654.

**Macroxus tephrogaster*, Gray, Ann. & Mag. Nat. Hist. ser. 3, xx. p. 431.

**Macroxus tæniurus*, Gray, loc. cit.

**Macroxus medellinensis*, Gray, op. cit. ser. 4, x. p. 408 (1872).

(*Sciurus tephrogaster*, Allen, Mon. N.-Am. Rodent. p. 763 (1877)).

Hab. Mexico; Honduras; Guatemala; Columbia.

Average length nearly 9 inches, of tail-vertebræ 7.25 inches. Two upper premolars. Upper parts dark olive, often darker along the

¹ Cf. *anteà*, p. 660.

² Cf. *infra*, p. 670.